SANbloc Series
Installation Guide

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Table Of Contents

Disclaimer and Warranty 3

Disclaimer 3

Warranty 3

Preface 11

Audience 11

Conventions Used In This User Guide 11

Getting Support 12

FCC Statement 12

European Community Statement 13

Safety Statements 14

Chapter 1: Introduction 17

Introduction 17

Features 17

Disk Drive Carrier 18

Power Supplies 18

Cooling System 18

I/O Option Modules 20

Products Covered in this User Guide 21

Chapter 2: Installation 25

Safety Statements 26

Unpacking and Initial Setup 28

Installing the System in an Equipment Rack 28

Ambient Temperature 28
Air Flow 29
Mechanical Loading 29
Electrical Considerations 30

Circuit Overloading 30

Chapter 3: Cabling and Configuration 31

Setting the Enclosure ID 31

Configurations 34

JBOD Configurations 34

Single I/O Module to Host Configuration 35
Dual I/O Module to Host Configuration 37
RAID Configurations 40

Fibre Channel RAID Controller LED Definitions... 40
Cabling RAID Configurations 41

Single RAID Controller to Host Configuration .. 41
Dual RAID Controller to Host Configuration 44

Chapter 4: System Monitoring.....47

Overview 47

LS Module 47

LS Module Features 48
SANbloc Enclosure LEDs 48
Disk Drive LEDs 51

Power Supply LEDs 53

Advanced Cooling Module (ACM) LEDs..... 54

Chapter 5: Installing/Removing Components 55

Location of the Components..... 56

Installing and Removing a Disk Drive Carrier..... 57

Installing a Disk Drive Carrier 57
Removing a Disk Drive Carrier..... 57

Installing and Removing an LS Module..... 59

Installing an LS Module 59
Removing an LS Module..... 59

Installing and Removing a Power Supply 61

Installing a Power Supply..... 61
Removing a Power Supply 61

Installing and Removing an ACM..... 62

Installing an Advanced Cooling Module..... 62
Removing an Advanced Cooling Module 62

Installing and Removing an I/O / RAID Controller 63

Installing an I/O Module or RAID Controller.... 63
Removing an I/O Module or RAID Controller .. 63

Appendix A: Safety Statement Translations...65

Appendix B: Technical Specifications 75

Index

Preface

This Installation Guide describes the installation and operation of the SANbloc Series. The following products are covered: SANbloc FC2100 Series (JBOD) and SANbloc FC2500 Series (RAID).

Audience

This Installation Guide is intended for use by the person installing and operating the SANbloc Series. This Installation Guide describes the operation of the SANbloc Series only. For details relating to the host system, refer to the documentation supplied with the host system.

Conventions Used In This User Guide

The following conventions are used throughout this Installation Guide.

Note: *A NOTE gives general information, such as helpful tips and references to related information.*

CAUTION: A CAUTION means take care. There is a risk of causing damage to the equipment or losing data.

WARNING: A WARNING means beware. There is a risk of electric shock or personal injury. Before working on the Storage Array be aware of the hazards that exist.

Getting Support

If you are having difficulties installing or operating your SANbloc Series you can contact our World Wide Support Centre for assistance at:

Telephone:	+353-1-2061333 or 1-800-2184921 (from U.S only)
email:	support@eurologic.com
WWW	http://www.eurologic.com/support

FCC Statement

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC Rules.

These limits are desigend to provide reasonable protection against harmful interference when operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at his own expense.

Any changes or modifications to this equipment not expressly approved by Eurologic Systems Ltd. could void the user's authority to operate this equipment.

European Community Statement

This equipment complies with the following European directives:

EMC Directive 89/336/EEC and amending Directives 92/31/EEC and 93/68/EEC Low Voltage Directive 73/23/EEC.

Safety Statements

The following safety statements must be read before installation. For language translations of these statements refer to Appendix B.

CAUTION

CAUTION: This equipment is intended only for installation in a restricted access location.

CAUTION: Allow disk drives and power supplies to reach room ambient temperature before powering on the system.

CAUTION: It is recommended that if interconnecting equipment resides within more that one equipment rack cabinet, these cabinets should be at the same ground potential.

CAUTION: Before attempting to install or remove any of the components, ensure that anti-static precautions have been taken. The minimum requirement is an anti-static wrist strap and grounding wire.

CAUTION: When installing or removing a rackmount shelf, remove all power supplies and disk drives. It is recommended that you work with at least one other person. This is necessary to prevent personal injury and damage to the shelf.

CAUTION

CAUTION: The tower skin set is not a field replaceable unit and therefore must not be removed from the Storage Array.

CAUTION: After removing the LS Module the resulting hole must be blocked, by installing a blanking plate or by installing a replacement LS Module. Failure to do so can disrupt air flow and seriously reduce cooling.

WARNING: A possible shock hazard may exist in the area of the fan connection.

WARNING: Disconnect the AC power cord before removing the power supply from the storage enclosure.

WARNING: The module handles are to facilitate the easy insertion and removal of the modules, they should not be used to lift and/or carry the enclosure.

Chapter 1: Introduction

This Chapter introduces the SANbloc Series. The main features of the Series are described along with a list of the models that are available.

Introduction

The SANbloc series is a new concept in data storage, that provides the optimum in investment protection and versatility. It can be configured for RAID or JBOD (copper or optical interface) environments, and will meet the performance, capacity and high availability needs of the widest variety of applications, such as video, imaging, prepress, data warehouses, OLTP, and web servers. The SANbloc series includes the FC2500 Fibre RAID engine, and FC2100 Fibre JBOD enclosure.

Features

The following are the main features of the SANbloc Series:

- Redundant, hot swappable AC power supplies with redundant AC input cords
- Redundant, hot swappable Cooling System. The system will operate within the temperature specification, with one of the four fans failed.
- Two redundant LS Modules (Loop Resiliency and SES Module), with active/passive failover on environmental monitoring
- Enclosure Services via in-band SES
- Enclosure events notified through LEDs and audible alarm (with software or manual disable)
- Optional one or two Fibre Channel RAID Controllers
- ID switch module to set enclosure ID

- Support for 14 Fibre Channel 1” disk drives
- Dual fibre channel loop support with two LS modules
- 2GB ready midplane
- Disk drive hot plug supported
- Optional Fibre Channel optical interface support on I/O module
- Rail kit for nineteen inch rack mounting option

Disk Drive Carrier

The disk drive carrier supports one inch, SCA-2 direct attach disk drives. The SANbloc Series can hold up to fourteen disk drive carriers. The disk drives can be hot swapped and the disk drive carriers provide for blind mating.

Power Supplies

The SANbloc Series has two power supplies for normal operation, providing redundancy of the power system. The power supplies can be hot swapped. The power supplies provide 673 Watts continuous output power and 853 Watts peak output power. The power supplies have a universal input voltage range, and active current sharing. Power factor correction, over current and over voltage protection is also provided, along with AC voltage brown-out detection. The power supplies have individual power inputs.

Cooling System

Cooling is provided by the two Advanced Cooling Modules (ACMs) located at the rear of the enclosure. Each of the ACM units contain two variable speed fans. The enclosure requires four fans for normal operation, but will operate correctly with one fan failed (redundancy is lost if one fan is failed in either ACM), however, it is recommended that the failed fan be replaced as soon as possible. The ACM units can be hot swapped. The LS Module monitors and controls the speed of each fan. The speed is set

depending on the ambient temperature and failed status. The fans are set to full speed if one fan is failed. The following table shows how the fan speed relates to temperature change.

Table 1-1Fan Speed vs. Temperature Change

ACM Speed	Ambient Temp (^{0}C)
Speed 1	0 to 26
Speed 2	26 to 28
Speed 3	28 to 30
Full Speed	30 +

Note: *All fans are set to the same speed.*

I/O Option Modules

The two rear I/O option modules can contain a range of different option modules. The LS module will detect the type of option module installed. The available option modules are:

Fibre Channel RAID Controller

A 1 x 2 FC to FC (1FC host port x 2 FC drive ports) controller is available. Active / Active failover is supported when redundant RAID controllers are used. The redundant controllers can be installed in the same enclosure and have shared FC device channels. The RAID Controller module also provides an HSSDC expansion port for one of the device loops. Correspondingly, a dual controller configuration will provide port expansion for both device loops. The voltage required for MIA support is provided by the RAID controller's DB9 connector.

I/O Expansion Module - Copper HSSDC

The I/O expansion module is used for JBOD applications. This expansion module has two HSSDC connectors. The first is the primary FC loop input port and the second is available for FC loop expansion / input. A fibre channel loop back terminator is not required. The I/O Expansion module should also be installed in single RAID controller enclosures, if the expansion to other enclosures is to be in dual loop mode.

I/O Expansion Module - Optical

The I/O expansion module is used for JBOD applications. ***1GB/Sec Optical FC I/O Expansion Module*** has an SC optical connector as the FC Loop Input port. Loop expansion is supported by the HSSDC. A loop back terminator is not required.

Products Covered in this User Guide

This User Guide covers the SANbloc Series. The following table shows the part numbers covered and a brief description of each.

Part Number	Description
FC2501DT (tower) FC2501DR (rack)	FC2500 Fibre RAID - Dual RAID Controllers and LS Modules
FC2501ST (tower) FC2501SR (rack)	FC2500 Fibre RAID - Single RAID Controller and LS Module
FC2101CDT (tower) FC2101CDR (rack)	FC2100 Fibre Copper JBOD - Dual I/O Modules and LS Modules
FC2101ODT (tower) FC2101ODR (rack)	FC2100 Fibre Optical JBOD - Dual I/O Modules and LS Modules
FC2101CST (tower) FC2101CSR (rack)	FC2100 Fibre Copper JBOD - Single I/O Module and LS Module
FC2101OST (tower) FC2101OSR (rack)	FC2100 Fibre Optical JBOD - Single I/O Module and LS Module

Figure 1-1SANbloc Series Tower Model

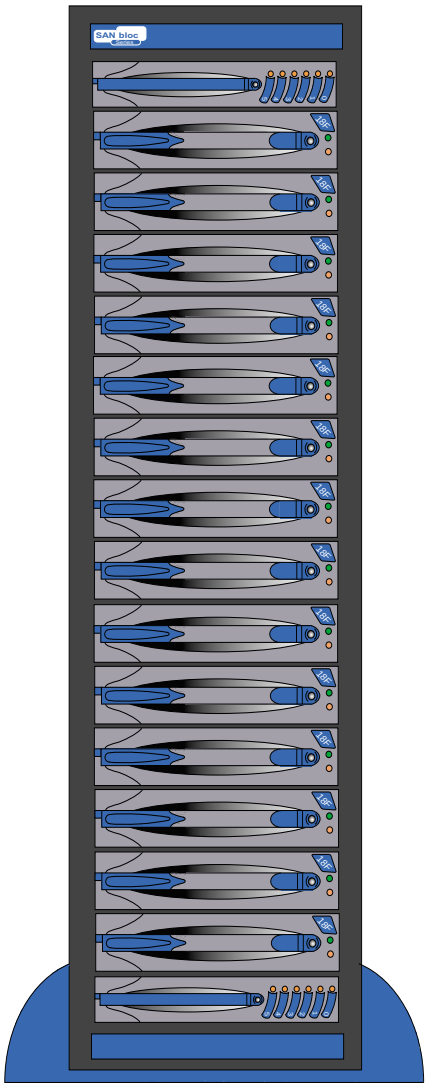
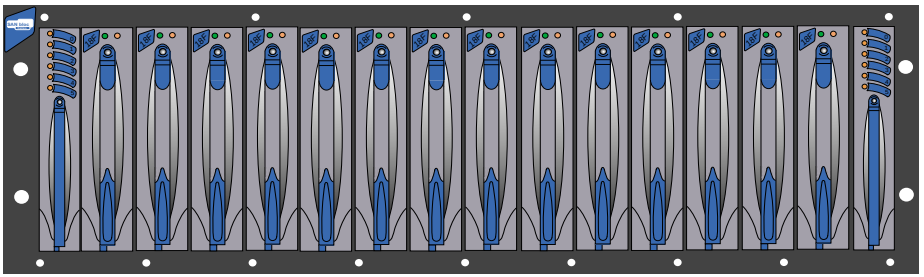


Figure 1-2SANbloc Series Rack Model



Chapter 2: Installation

This Chapter describes the installation of the SANbloc Series. Important safety instructions are discussed along with the electrical, mechanical and environmental precautions that need to be taken.

Note: *Please read this Chapter carefully before attempting to install or operate the SANbloc Series.*

Safety Statements

CAUTION

The following safety statements must be read before you install or operate the SANbloc Series. For language translations of these statements refer to Appendix B.

CAUTION: This equipment is intended only for installation in a restricted access location.

CAUTION: Before attempting to install or remove any of the components, ensure that anti-static precautions are taken. The minimum requirement is, a properly grounded anti-static wrist strap and ground wire.

CAUTION: If any of the components are removed the resulting hole must be blocked, by installing a component blank or replacing the component. Failure to do so can seriously restrict air flow and cooling.

CAUTION: This device should be connected to a power source which carries a fuse or circuit breaker that is greater than the rating of the shelf, but also complies with national wiring standards.

CAUTION: Allow disk drives and power supplies to reach room ambient temperature before powering on the shelf.

CAUTION: It is recommended that, if interconnecting equipment resides within more than one equipment rack cabinets, these equipment racks should be at the same ground potential.

WARNING: A possible shock hazard may exist in the area of the fan connection.

WARNING: Disconnect the AC power cord before removing the power supply from the storage enclosure.

Unpacking and Initial Setup

When you receive your system, visually inspect the exterior of the packaging for any signs of damage. If any damage is found the carrier and Eurologic should be informed immediately, and they will advise you of the appropriate action. The cartons are sealed using packaging tape which should be cut open in the normal manner. Exercise caution when lifting out the components. At this point the contents should be verified against the packing list and Eurologic should again be notified if any discrepancies exist. The disk drives are packaged in anti-static packaging and anti-static precautions must be observed prior to removal.

Installing the System in an Equipment Rack

Before installing the SANbloc Series in an equipment rack, it is essential that the following guidelines are complied with, to ensure the safe and efficient operation of the system. The SANbloc Series can be installed in open or closed equipment racks, with a front width of 19", by observing the environmental, electrical, and mechanical precautions described below.

Ambient Temperature

Installation of the rack system in a standard 19" cabinet may lead to a differential between the room ambient temperature and the internal ambient temperature of the rack environment. The operating temperature of the SANbloc Series is between 10^{o}C to 40^{o}C. However, it is not recommended that the system be continuously run at these extreme

temperatures. Consideration should therefore be given to ensure that the room ambient temperature is compatible with these specifications.

Air Flow

To ensure that the internal heat build up is properly dissipated into the room environment, air flow should in no way be restricted. It is essential that no air vents are blocked, and that the system is a minimum of one meter from a solid surface such as a wall or partition. Air flow through the SANbloc Series is from front to rear.

Mechanical Loading

Consideration should be given to the loading of the equipment rack. To maintain a low centre of gravity (thus reducing the likelihood of instability) racks should be loaded (where possible) from the bottom of the equipment rack upwards. This is recommended to ensure personal safety.

CAUTION: When installing or removing a rack mount enclosure, remove all disk drives. It is recommended that you work with at least one other person when installing an enclosure. This is necessary to prevent personal injury and damage to the shelf.

Electrical Considerations

When installing the SANbloc Series the following electrical considerations must be applied.

Circuit Overloading

Care should be taken to ensure that the current does not exceed the rating of the power source circuitry. This includes cabling, power distribution units, filters and any other devices through which the main AC flows. The electrical power rating of the enclosure is 100 - 240 VAC, 10 - 5 Amps (50/60 Hz), and must be added to the power demands of any other electrical devices installed in the equipment rack to arrive at a total power consumption figure. In addition, surge currents must be catered for. Disk drives may consume twice the amount of current at start-up time as they do during steady state operation.

Chapter 3: Cabling and Configuration

This Chapter describes the procedure for connecting your SANbloc Series to a host computer(s). Detailed information on how to configure and daisy chain enclosures is also provided along with instructions on how to set the enclosure ID.

Setting the Enclosure ID

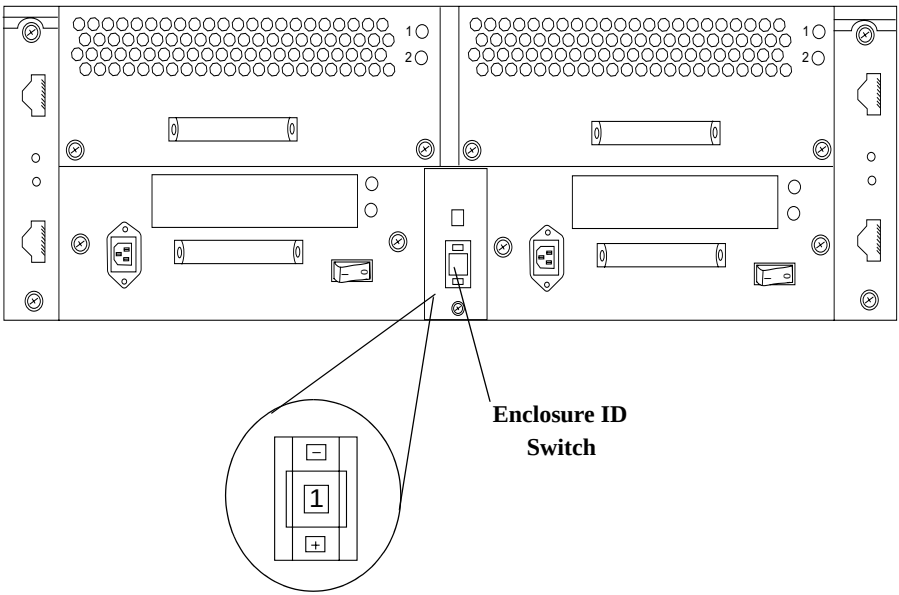
Each of the fourteen disk drive slots of the SANbloc Series has a unique identifier assigned to it. This identifier is assigned using a combination of the Slot number and the enclosure ID.

The enclosure ID is set, using the enclosure ID switch, located on the rear of the SANbloc (see Figure 3-1).

Note: *The enclosure ID must be set prior to powering on the enclosure.*

Note: *Each enclosure must have a seperate ID when daisy chained together.*

Figure 3-1 Location of Enclosure ID Switch



This enclosure ID switch can be set to 0 through 7.

The graphic below shows the slot number and location.

Slot location when viewed from the front of the enclosure

LSM	Slot 13	Slot 12	Slot 11	Slot 10	Slot 9	Slot 8	Slot 7	Slot 6	Slot 5	Slot 4	Slot 3	Slot 2	Slot 1	Slot 0	LSM

The fourteen disk drive slots (0 to 13), will be assigned an identifier based on the enclosure ID and the slot number as shown in Table 3-1.

Table 3-1Disk Drive Identifier Table

Enclosure ID → / Drive Slot ↓	0	1	2	3	4	5	6	7
Slot 0	3	18	33	48	63	78	93	108
Slot 1	4	19	34	49	64	79	94	109
Slot 2	5	20	35	50	65	80	95	110
Slot 3	6	21	36	51	66	81	96	111
Slot 4	7	22	37	52	67	82	97	112
Slot 5	8	23	38	53	68	83	98	113
Slot 6	9	24	39	54	69	84	99	114
Slot 7	10	25	40	55	70	85	100	115
Slot 8	11	26	41	56	71	86	101	116
Slot 9	12	27	42	57	72	87	102	117
Slot 10	13	28	43	58	73	88	103	118
Slot 11	14	29	44	59	74	89	104	119
Slot 12	15	30	45	60	75	90	105	120
Slot 13	16	31	46	61	76	91	106	121

Configurations

This section describes the procedures for cabling the main configurations of the SANbloc Series. Both JBOD and RAID configurations are described.

Note: *The following configuration procedures refer to connecting the SANbloc Series directly to the host system. It is also possible to connect the system using a Hub/Switch.*

CAUTION: Before working on the enclosure, ensure that anti-static precautions have been taken. The minimum requirement is an anti-static wrist strap and grounding wire.

JBOD Configurations

There are two JBOD configurations covered in this Installation Guide:

- Single I/O module to host
- Dual I/O module to host

Within these configurations, the procedure for daisy chaining enclosures together will also be described.

Single I/O Module to Host Configuration

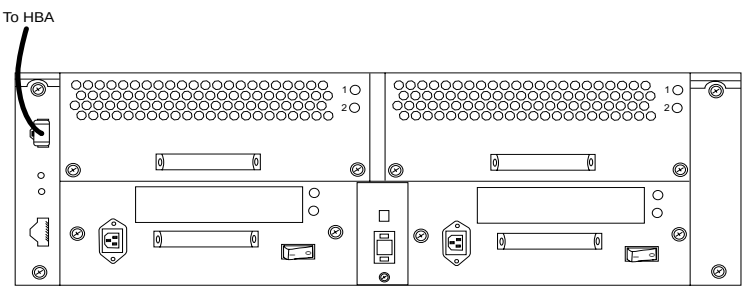
This section describes the procedure for connecting enclosures with one I/O module (Copper HSSDC or Optical) to your host computer, and also how to daisy chain these enclosures together. Having a single I/O module provides single Fibre Channel loop operation.

To connect the single I/O module enclosure to the host:

1. Insert the HSSDC/Optical connector on the cable, into the connector on the enclosure (see Figure 3-2).
2. Insert the other end of the cable into the connector on your HBA.

Note: *For details on your host and/or HBA refer to the documentation that was supplied with the Host / HBA.*

Figure 3-2 Connecting single I/O module to a host

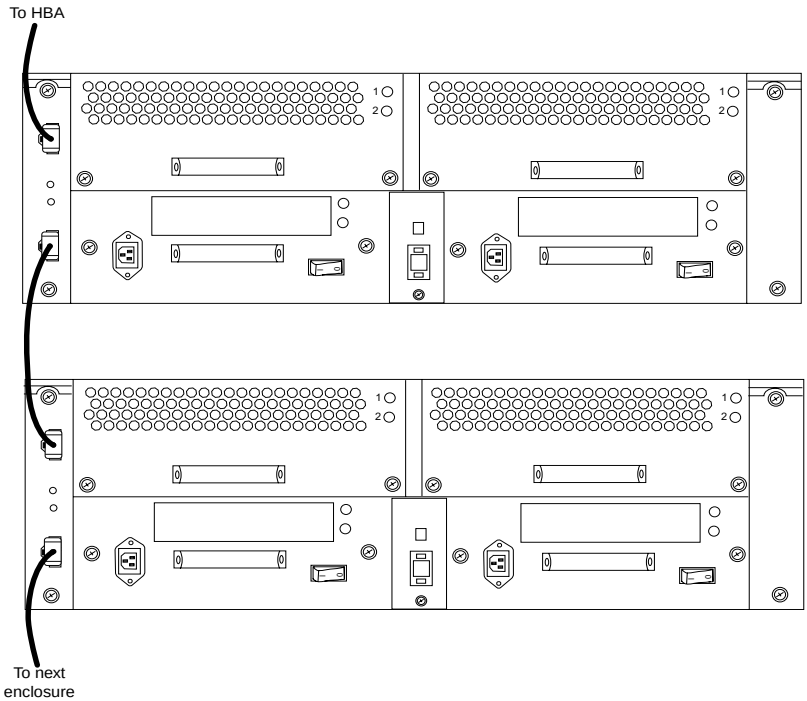


See Appendix C for Loop Diagram or **click here to view**.

To daisy chain enclosures together connect the link cable from the HSSDC/Optical I/O module of the first enclosure to the HSSDC/Optical I/O module of the next enclosure (see Figure 3-3).

Note: *A maximum of eight enclosures may be daisy chained together.*

Figure 3-3 Daisy chaining single I/O module enclosures



See Appendix C for Loop Diagram or **click here to view.**

CAUTION: When daisy chaining enclosures, you must ensure that each enclosure has a unique Enclosure ID as described in "Setting the Enclosure ID" on page 31.

Dual I/O Module to Host Configuration

Note: *For dual I/O enclosures there must be two LS modules installed in the enclosure.*

This section describes the procedure for connecting enclosures with two I/O modules (Copper HSSDC or Optical) to your host computer, and also how to daisy chain these enclosures together. Having dual I/O modules provides dual Fibre Channel loop operation.

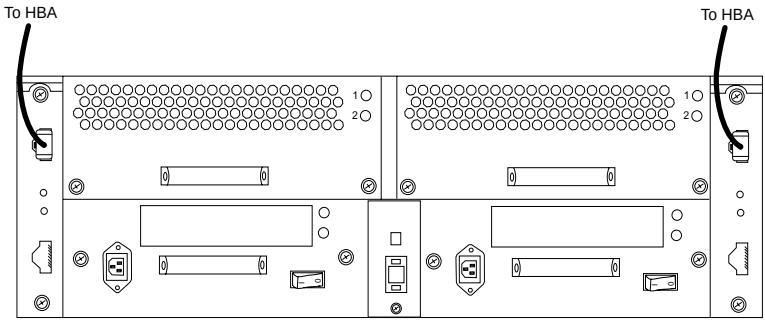
To connect the dual I/O module enclosure to the host:

Note: *You will need two HBA's in your host system or a single HBA with support for two connections, or two hosts with single HBA's.*

1. Insert the HSSDC/Optical connector on the first cable, into the connector on the first I/O module (see Figure 3-4).
2. Insert the other end of this cable into the connector on your HBA.
3. Insert the HSSDC/Optical connector on the second cable, into the connector on the second I/O module (see Figure 3-4).
4. Insert the other end of this cable into the connector on your HBA.

Note: *For details on your host and/or HBA refer to the documentation that was supplied with the Host / HBA.*

Figure 3-4 Connecting dual I/O modules to a host

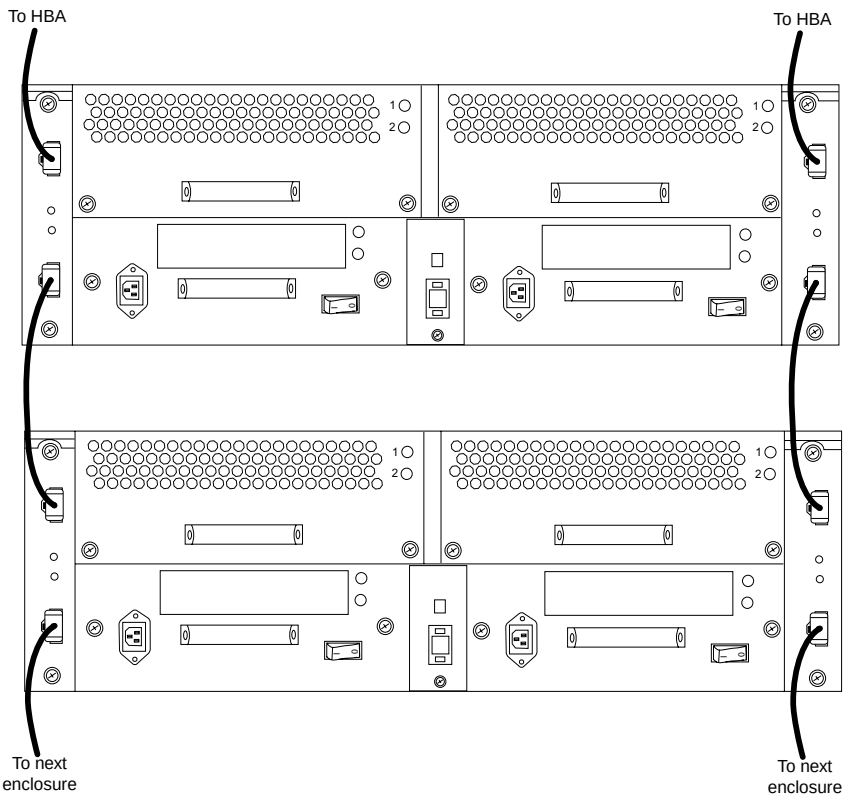


See Appendix C for Loop Diagram or **click here to view.**

To daisy chain enclosures together connect the link cables from the HSSDC/Optical I/O modules of the first enclosure to the HSSDC/Optical I/O modules of the next enclosure (see Figure 3-5).

Note: *A maximum of eight enclosures may be daisy chained together.*

Figure 3-5 Daisy chaining dual I/O module enclosures



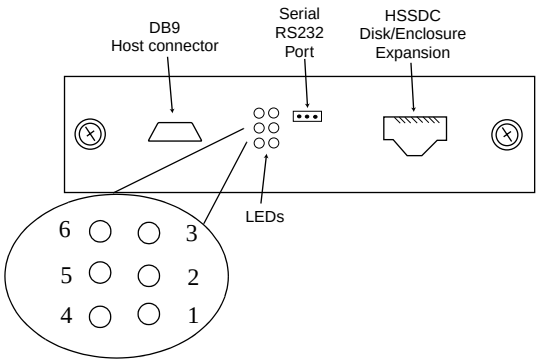
See Appendix C for Loop Diagram or **click here to view.**

CAUTION: When daisy chaining enclosures, you must ensure that each enclosure has a unique Enclosure ID as described in "Setting the Enclosure ID" on page 31.

RAID Configurations

The main parts of the RAID Controller are shown in Figure 3-6.

Figure 3-6 FC2500 RAID Controller



Fibre Channel RAID Controller LED Definitions

The fibre channel RAID controller has 6 LED indicators as shown above. The LEDs are numbered and defined as follows:

	Description	Color	Indication
LED1	Controller Not Ready	Amber	ON = Controller not ready
LED2	Controller Ready	Green	Normally ON = controller booted successfully
LED3	FC Host port active	Green	ON = activity on host port OFF = no activity on host port
LED4	Controller partner failed	Amber	ON = partner controller detected as failed
LED5	Cache Dirty	Amber	Indicates status of cache memory
LED6	FC Device Port(s) Active	Green	ON = activity on device ports OFF = no activity on device ports

Cabling RAID Configurations

There are two main RAID configurations:

- Single RAID Controller
- Dual RAID Controller (fully redundant)

Within these configurations, the procedure for daisy chaining enclosures together will also be described.

Single RAID Controller to Host Configuration

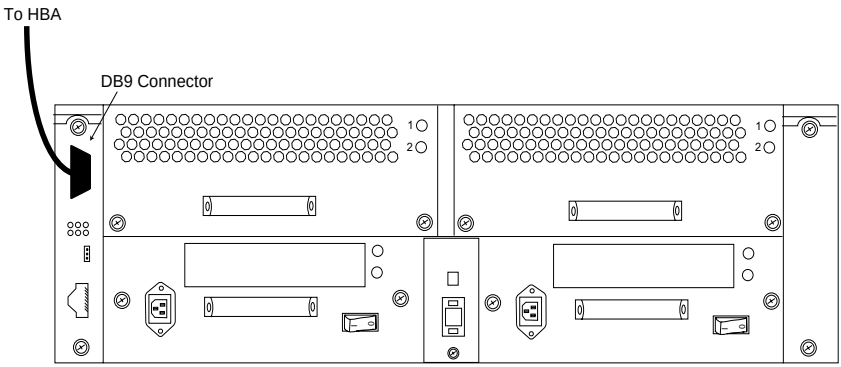
This section describes the procedure for connecting an enclosure with one RAID controller to your host system.

To connect the single RAID controller enclosure to your host system:

1. Attach the DB9 type connector of the host cable to the DB9 connector on the RAID controller, located on the rear of the enclosure (see Figure 3-7).
2. Attach the other end of this host cable to your host systems HBA.

Note: *For details on your host/HBA refer to the documentation that was supplied with the Host / HBA.*

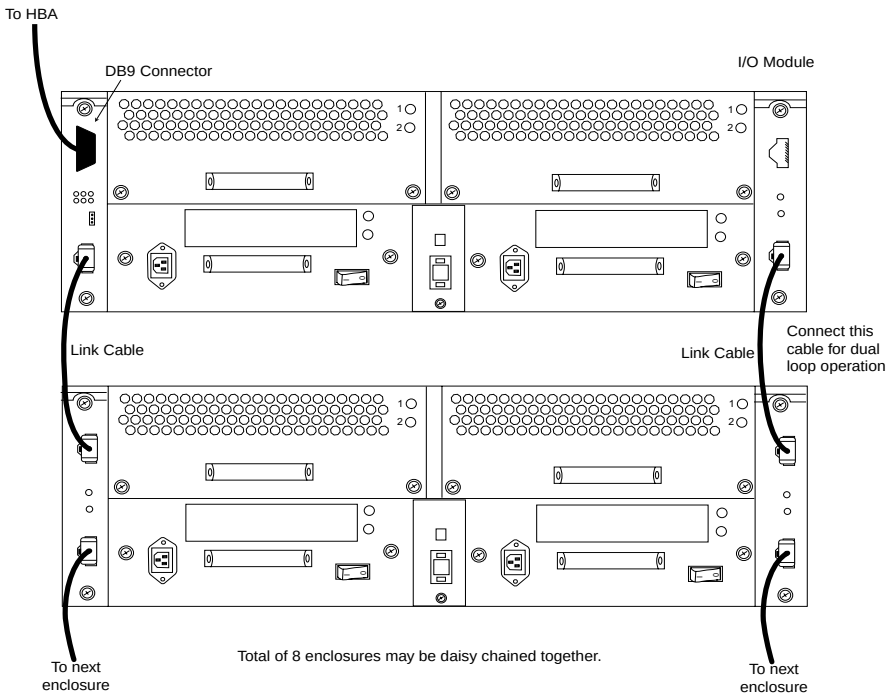
Figure 3-7 Connecting single RAID enclosure to host



See Appendix C for Loop Diagram or **click here to view.**

To expand this system it is possible to daisy chain this enclosure to a JBOD enclosure. This is done by connecting a link cable between the HSSDC connector on the RAID enclosure to the HSSDC connector of the expansion enclosure. To achieve dual loop operation connect a second link cable from the HSSDC connector on the I/O module of the RAID enclosure to the HSSDC connector of the second I/O module on the expansion enclosure (see Figure 3-8).

Figure 3-8 Daisy chaining single RAID enclosure



See Appendix C for Loop Diagram or **click here to view**

Note: *For dual I/O enclosures there must be two LS modules installed in the enclosure.*

CAUTION: When daisy chaining enclosures, you must ensure that each enclosure has a unique Enclosure ID as described in "Setting the Enclosure ID" on page 31.

Dual RAID Controller to Host Configuration

Note: *For dual RAID enclosures there must be two LS modules installed in the enclosure.*

This section describes the procedure for connecting an enclosure with dual RAID Controllers (redundant controllers) to your host system.

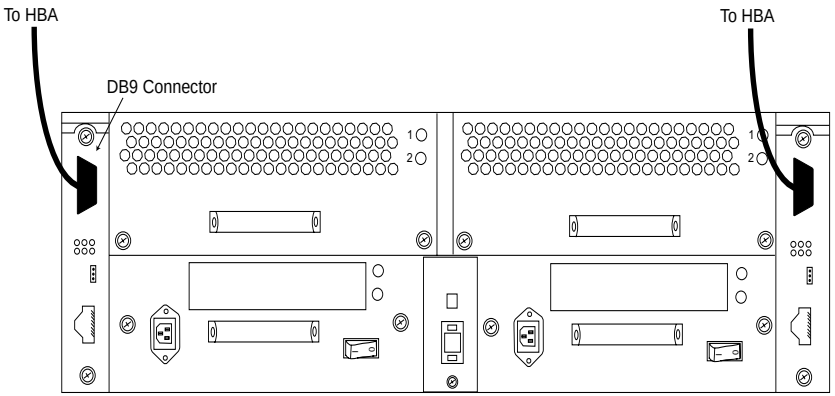
It is also possible to use this configuration as two RAIDs (i.e. non-redundant controllers). In this configuraion the dual drive loops are shared between the RAID systems.

To connect the dual RAID controller enclosure to your host system:

Note: *You will need two HBA's in your host system or a single HBA with support for two connections. A hub, switch or 2 hosts with HBA may also be used.*

1. Insert the DB9 connector on the first cable, into the DB9 connector on the first RAID controller (see Figure 3-9).
2. Insert the other end of this cable into the connector on your HBA.
3. Insert the DB9 connector on the second cable, into the DB9 connector on the second RAID controller (see Figure 3-9).
4. Insert the other end of this cable into the connector on your HBA.

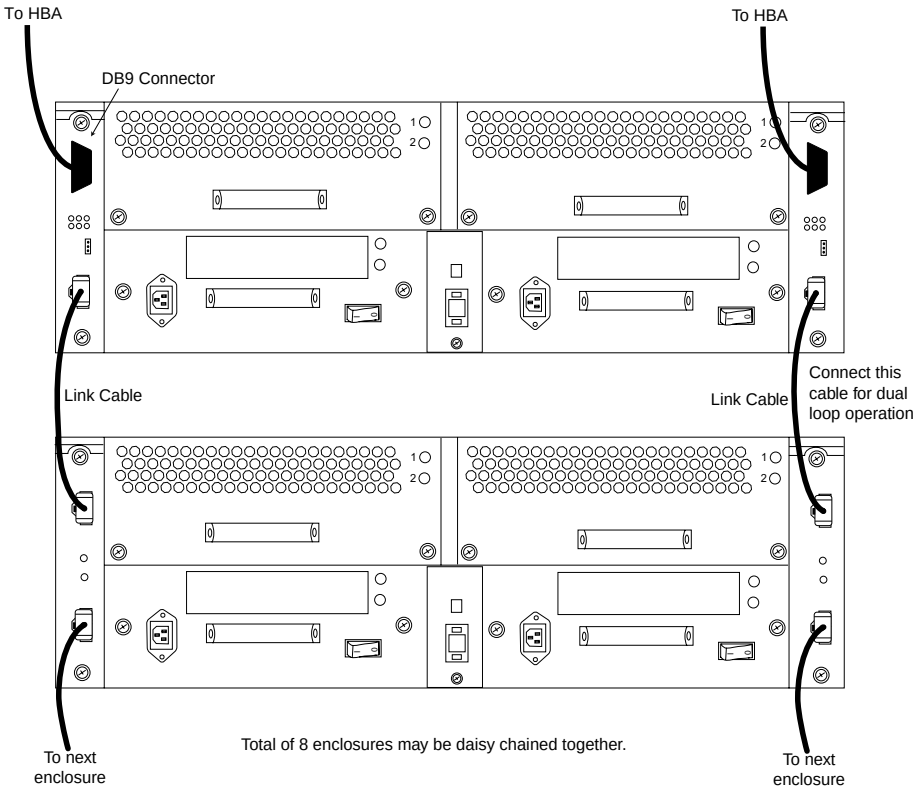
Figure 3-9 Connecting dual RAID controllers to a host



See Appendix C for Loop Diagram or **click here to view.**

To expand this system it is possible to daisy chain this enclosure to an expansion enclosure. This is done by connecting a link cable between the HSSDC connector on the RAID enclosure to the HSSDC connector of an expansion enclosure. To achieve dual loop operation connect a second link cable from the HSSDC connector on the second RAID controller to the HSSDC connector of the second I/O module on the expansion enclosure (see Figure 3-10).

Figure 3-10 Daisy chaining dual RAID enclosures



See Appendix C for Loop Diagram or **click here to view.**

CAUTION: When daisy chaining enclosures, you must ensure that each enclosure has a unique Enclosure ID as described in "Setting the Enclosure ID" on page 31.

Chapter 4: System Monitoring

This Chapter describes the devices used to monitor the SANbloc Series. The location of the monitoring LEDs and how to interpret them is provided.

Overview

The front mounted LS module is the main monitoring device of the SANbloc Series. This module is complemented by status and fault LEDs, mounted on all the major components of the enclosure, such as, disk drives, power supplies, and Advanced Cooling Modules (ACMs). All these monitoring devices are discussed in the following sections.

LS Module

The LS Module (Loop Resiliency and SES Module) provides monitoring and control for the SANbloc Series. The module reports status and receives control information over the Enclosure Services Interface (ESI) port of any of the fourteen disk drives installed in the enclosure. The LS Module also provides loop resiliency for the Fibre Channel loop (in the form of Port Bypass Circuits).

The SANbloc Series contains one LS Module as standard. However, a second optional LS Module is available to provide active/passive fail over for the enclosure services communication, and to provide a second Fibre Channel Loop. Only one LS Module communicates (using ESI communication) with the host system at any one time, but both LS modules will continuously monitor the system. If

the active LS Module fails, then the ESI communication with the host system will be taken over by the passive LS Module.

LS Module Features

- Monitoring/Control for 2 Power Supplies and 2 ACMs
- Reports status and receives control information via the FC loop
- Microcontroller for data processing, control and communications
- Volatile and non-volatile memory for the microcontroller
- Temperature sensor
- Audible alarm with manual and software disable
- FC link monitoring and status information
- Firmware download capability
- Reporting of PSU, LS module, I/O module, and backplane serial number and revision
- I/O module and backplane type reporting
- Control of 6 front LEDs for enclosure and module status
- I/O option slot status monitoring

SANbloc Enclosure LEDs

The SANbloc Series has six LEDs located on each of the front mounted LS Modules. These LEDs show the status of the enclosure, power supply, Fibre Channel Loops, LS Module status and the operating mode of the enclosure (1GB or 2GB[1] operation). Figure 4-1 shows the location of the LEDs

1. 2GB option is not currently supported

Figure 4-1Location of SANbloc Enclosure LEDs

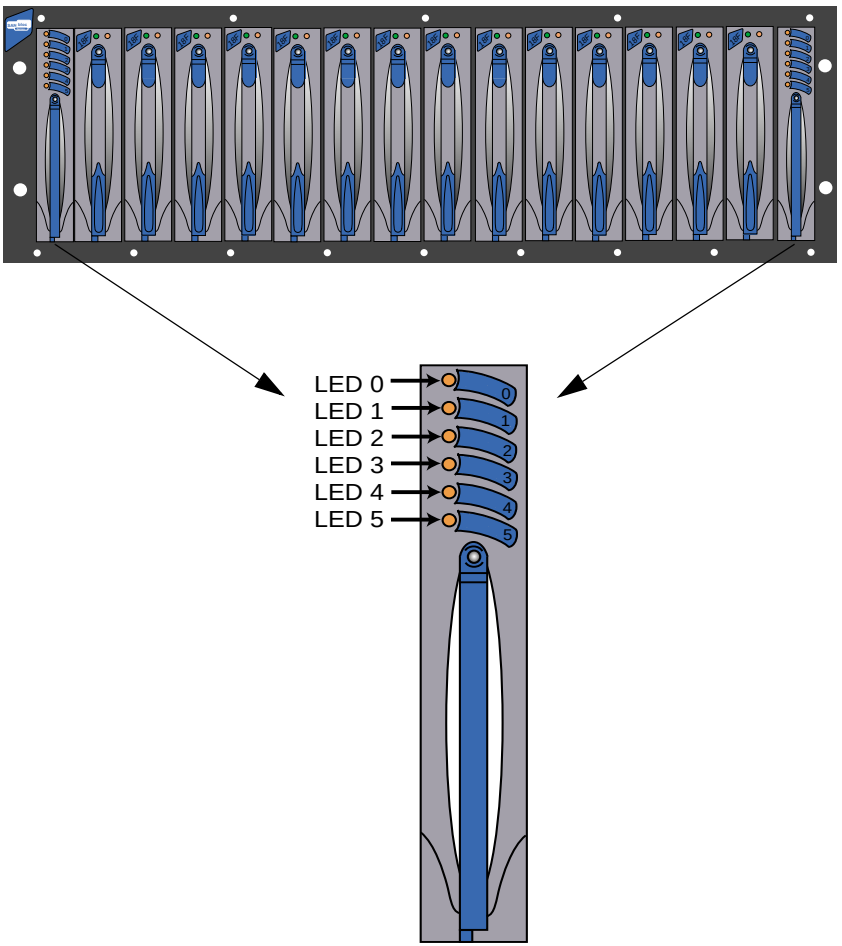


Table 4-1 shows the meaning of each of the LEDs, and how to interpret them.

Table 4-1Enclosure LED Descriptions

	Description	Color	Indication
LED 0	Power On	Green	Normally **ON**, indicates power is applied. **OFF** indicates no power.
LED 1	Shelf Fault	Amber	Normally **OFF** indicates no faults exist in the enclosure. **ON** indicates a fault.
LED 2	FC Loop A	Green	ON indicates FC Loop A closed. OFF indicates FC Loop A open
LED 3	FC Loop B	Green	ON indicates FC Loop B closed. OFF indicates FC Loop B open.
LED 4	LS Fault	Amber	Normally OFF indicating that the LS Module has no fault. ON indicates an LS Module fault.
LED 5	2GB Operation[a]	Green	ON indicates the FC loop is operating at 2GB/Sec speed. OFF indicates the FC Loop is operating at 1GB/Sec Speed.

a. 2GB operation is not currently supported.

Note: *The audible alarm will sound when an error is detected.*

Disk Drive LEDs

Each disk drive carrier has two LED indicators visible from the front of the SANbloc enclosure. The green disk drive ready LED is controlled by the disk drive, and the bi-colour LED is controlled by the LS Module. The following table shows how to interpret these LEDs.

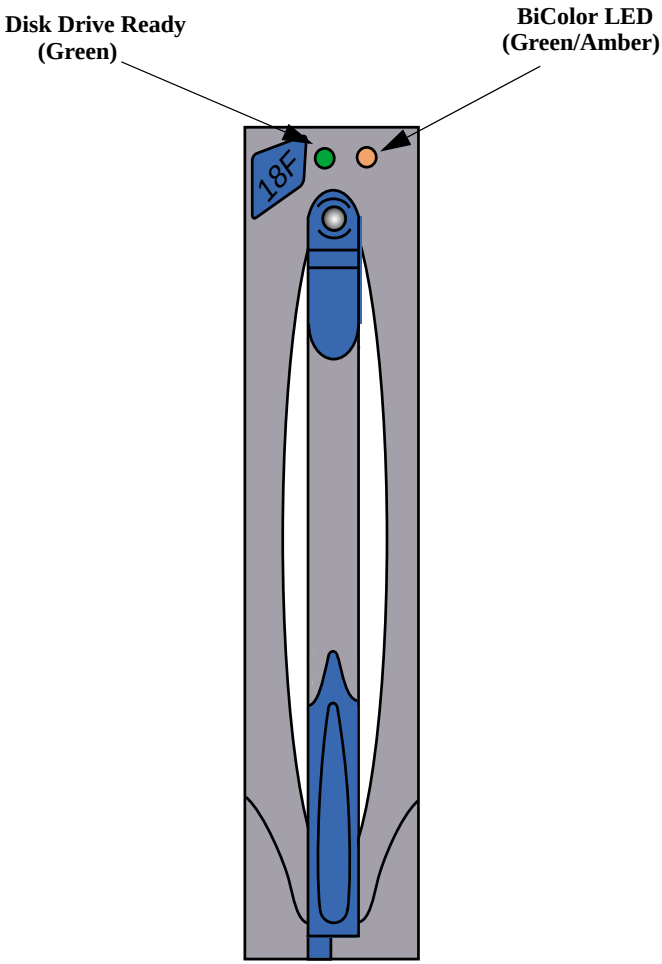
Table 4-2Disk Drive LED Descriptions

Drive Ready Green LED	Bicolor LED Green	Bicolor LED Amber	Condition
Drive Controlled	Off	Off	Slot empty, ready for insert
Drive Controlled	On	Off	Drive online, ready for operation
Drive Controlled	ON 125ms Off 125ms	Off Off	Drive Identify (POD)
Drive Controlled	ON 250ms Off 250ms	Off Off	Prepare for removal
Drive Controlled	On 500ms Off 125ms	Off Off	Drive Rebuild
Drive Controlled	Off	On 125ms Off 125ms	Drive Fail[a]
Drive Controlled	Off Off	On 125ms Off 750ms	Drive off-line, Loop A or Loop B[a]

a. The shelf fault Amber LED is On. This is visible from the front of the enclosure

Note: *The audible alarm will sound when an error is detected.*

Figure 4-2Disk Drive Carrier LEDs



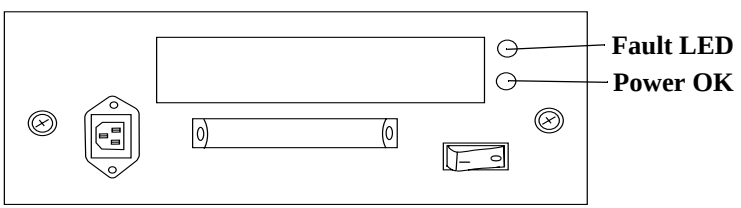
Power Supply LEDs

The SANbloc Series power supply provides power factor correction, over current and over voltage protection. The power supply also has 853W peak power and AC voltage brown out protection.

The SANbloc Series power supply has two LED indicators on it, which are visible from the rear of the enclosure. The green Power OK LED is on when the power supply is operating normally. This green LED is driven by the power supply, and indicates that the power supply output voltages are operating normally. The power supply amber Fault LED is driven by the LS Module and power supply. This amber LED is ON when the LS Module detects a power supply fault, or it will flash, when the power supply Locate feature is selected.

Note: *The audible alarm will sound when an error is detected*

Figure 4-3Power Supply LEDs

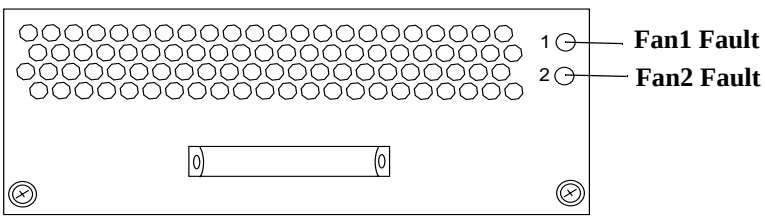


Advanced Cooling Module (ACM) LEDs

The SANbloc Series has two variable speed fans per advanced cooling module. Each of the two ACMs on the rear of the SANbloc Series enclosure has two fault LEDs visible from the rear of the enclosure. The LEDs are labeled “1” and “2” to correspond with the the two fans inside the ACM assembly. These LEDs are normally off and will only be on when a fault is detected in a fan by the LS Module.

Note: *The audible alarm will sound when an error is detected.*

Figure 4-4Advanced Cooling Module LEDs

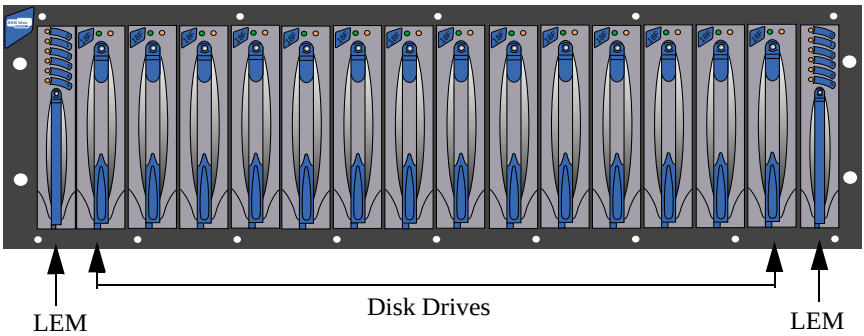


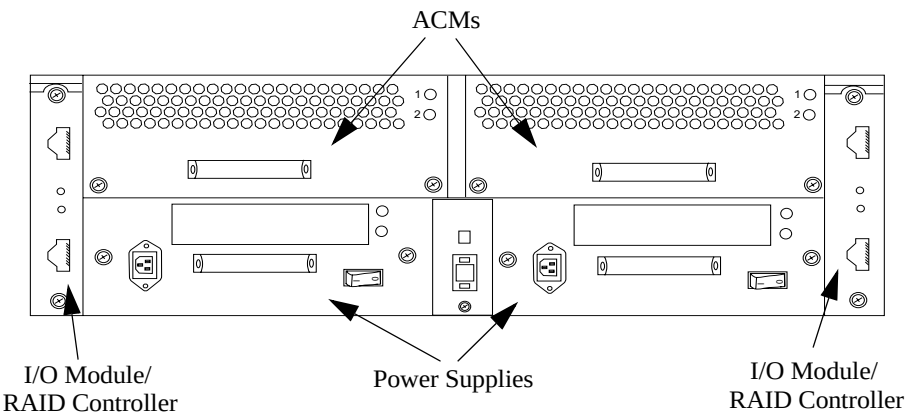
Chapter 5: Installing and Removing Components

This Chapter describes the procedures for installing and removing the replaceable components in the SANbloc Series.

WARNING: The module handles are to facilitate the easy insertion and removal of the modules, they should not be used to lift and/or carry the enclosure.

Location of the Components





Installing and Removing a Disk Drive Carrier

The disk drive carriers are located in the front of the enclosure. Follow these procedures to install and remove the disk drive carrier.

Installing a Disk Drive Carrier

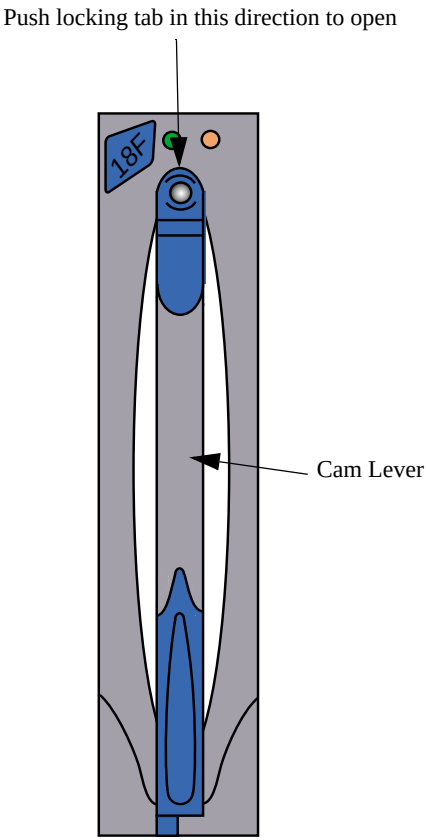
1. Select the disk drive slot into which the disk drive carrier is to be installed and remove the carrier blank if there is one installed.
2. Orient the disk drive carrier such that the LEDs are on the top (on the left for desk side systems).
3. With the cam lever fully open slide the carrier into the slot until the lever starts to close.
4. Fully close the cam lever. The lever is fully closed, and the drive locked in place, when the lever “clicks” into position.

Removing a Disk Drive Carrier

1. Using your finger, release the locking tab by pressing it in the direction shown in Figure 5-1, and pull the cam lever towards you.
2. Fully open the cam lever. (approx. 90^{o} to enclosure).
3. With the cam lever open wait for at least one minute to allow the disk drive to spin down fully before removing it.
4. Gently, pull the disk drive carrier out of the enclosure.

CAUTION: Immediately replace the disk drive carrier or install a disk drive carrier blank to maintain correct airflow.

Figure 5-1 Disk Drive Carrier



Installing and Removing an LS Module

The LS Modules are located in the front of the enclosure. Follow these procedures to install and remove the LS Modules.

Installing an LS Module

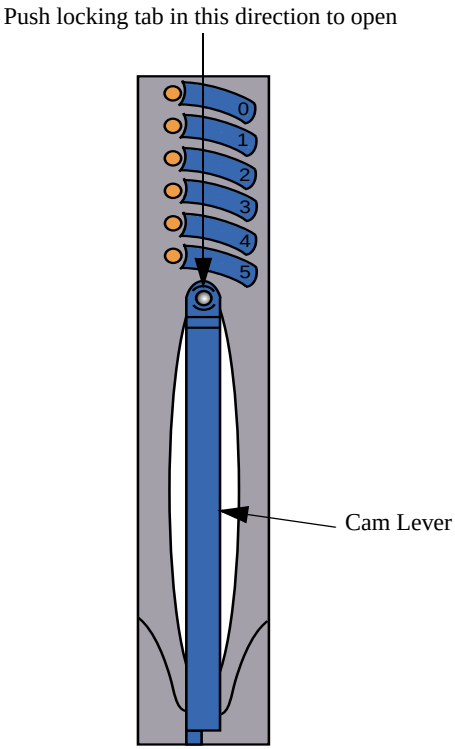
1. Select the LS Module slot in to which the LS Module is to be installed and remove the LS blank if one is installed.
2. Orient the LS Module such that the LEDs are on the top (on the left for deskside systems).
3. With the cam lever fully open slide the LS Module into the slot until the lever starts to close.
4. Fully close the cam lever. The lever is fully closed, and the LS Module locked in place, when the lever “clicks” into position.

Removing an LS Module

1. Using your finger, release the locking tab by pressing it in the direction shown in Figure 5-2, and pull the cam lever towards you.
2. Fully open the cam lever. (approx. 90^{o} to enclosure).
3. Gently, pull the LS Module out of the enclosure.

CAUTION: Immediately replace the LS Module or install an LS Module blank to maintain correct airflow.

Figure 5-2 LS Module



Installing and Removing a Power Supply

The power supplies are located in the rear of the enclosure. Follow these procedures to install and remove the power supplies.

Installing a Power Supply

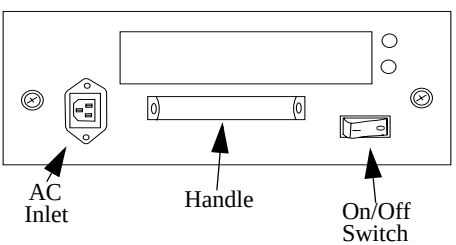
1. Select the power supply slot into which the power supply is to be inserted and remove the carrier blank if there is one installed.
2. Orient the power supply, such that the LEDs are on the bottom (on the right hand side for rack mount systems).
3. Gently slide the power supply into the empty power supply slot.
4. Secure in place using the two fixing screws (torque setting 0.3Nm).
5. Install the power cable into the AC Connector.

Removing a Power Supply

1. Turn off the power supply using the switch located on the power supply unit, and remove the power cable.
2. Loosen the two fixing screws.
3. Using the power supply handle, gently slide it out of the enclosure.

CAUTION: Immediately replace the power supply carrier or install a power supply carrier blank to maintain correct airflow.

Figure 5-3 Power Supply



Installing and Removing an Advanced Cooling Module

The advanced cooling modules are located in the rear of the enclosure. Follow these procedures to install and remove the advanced cooling modules.

Installing an Advanced Cooling Module

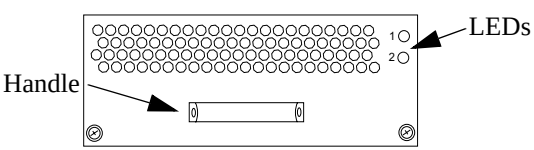
1. Select the advanced cooling module slot into which the module is to be installed.
2. Orient the module, such that the LEDs are on the bottom (on the right hand side for rack mount systems).
3. Gently slide the ACM into the empty ACM slot.
4. Secure in place using the two fixing screws (torque setting 0.3Nm).

Removing an Advanced Cooling Module

1. Loosen the two fixing screws.
2. Using the advanced cooling module handle, gently slide it out of the enclosure.

CAUTION: Immediately replace the ACM or install an ACM blank to maintain correct airflow.

Figure 5-4 Advanced Cooling Module



Installing and Removing an I/O Module or RAID Controller

The I/O module or RAID controller is located in the rear of the enclosure. Follow these procedures to install and remove the I/O module or RAID controller.

Installing an I/O Module or RAID Controller

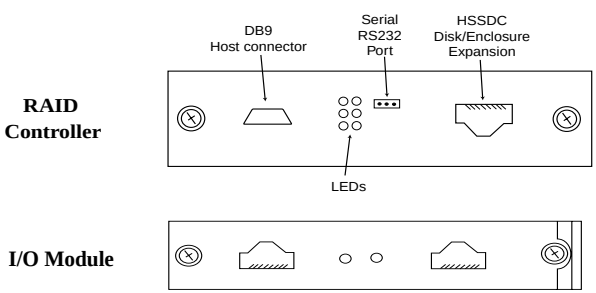
1. Remove the blank if there is one installed.
2. Gently insert the I/O module or RAID controller into the slot.
3. Secure in place using the two fixing screws (torque setting 0.3Nm).
4. Connect the cables as described in Chapter 3.

Removing an I/O Module or RAID Controller

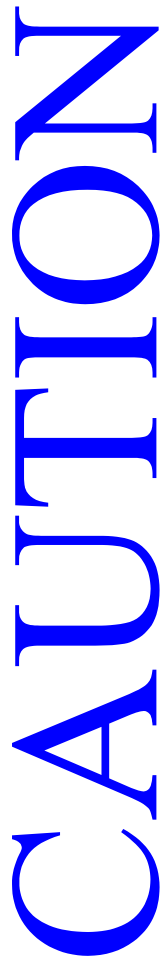
1. Remove all cables.
2. Loosen the two fixing screws.
3. Using the module handle, gently slide the I/O Module or RAID Controller out of the slot.

CAUTION: Immediately replace the carrier or install a blank to maintain correct airflow.

Figure 5-5 I/O Module and RAID Controller



Appendix A: Safety Statement Translations



CAUTION: This equipment is intended only for installation in a restricted access location.

ACHTUNG: **Dieses Gerät sollte nur an einem Ort mit Zugangskontrolle installiert werden.**

FÖRSIKTIGHET: **Denna utrustning får endast installeras på ställe med begränsad åtkomst.**

VAROITUS: **Laitteisto on tarkoitettu asennettavaksi ainoastaan sivullisilta suojattuun paikkaan.**

FORSIGTIG: **Dette udstyr er kun beregnet til installation i et område med begrænset adgang.**

OBS: **Dette utstyret er bare beregnet for installering på steder med adgangsbegrensning.**

CAUTION

CAUTION: **Allow disk drives and power supplies to reach room ambient temperature before powering on the shelf.**

ACHTUNG: **Ehe Laufwerke und Netzteile an die Stromversorgung angeschlossen werden, sollten sie sich an die Raumtemperatur angepasst haben.**

FÖRSIKTIGHET: **Låt skivdrivenheter och strömtillförsel nå rumstemperatur innan strömförsörjningen slås på.**

VAROITUS: **Ennen kuin kytket virran hyllyyn sijoitettuihin levyasemiin ja teholähteisiin, odota, että laitteet saavuttavat huoneiston lämpötilan.**

FORSIGTIG: **Sørg for, at drev og strømforsyninger har opnået rumtemperaturer, før strømmen tilsluttes hylden.**

OBS: **La diskstasjoner og strømforsyninger nå romtemperatur før du slår på strømmen til hyllen.**

CAUTION

CAUTION: **It is recommended that if interconnecting equipment resides within more than one equipment rack cabinet, these rack cabinets should be at the same ground potential.**

ACHTUNG: **Befinden sich Verbindungselemente in mehr als einem Rack-Gehäuse, sollten die Racks dasselbe Massepotential aufweisen.**

FÖRSIKTIGHET: **Vi rekommenderar, om förbindelseutrustning finns i mer än ett utrustningshyllskåp, att dessa hyllskåp ligger på samma jordpotential.**

VAROITUS: **Jos toisiinsa yhdistettyjä laitteita sijaitsee useammassa kuin yhdessä kehyksessä, on suositeltavaa sijoittaa kyseiset kehykset samalle tasolle.**

FORSIGTIG: **Hvis der i mere end ét udstyrsrackkabinet er indbyrdes forbundet udstyr, bør disse kabinetter have samme grundspænding.**

OBS: **Dersom sammenkoblingsutstyr er montert i mer enn ett kabinett i utstyrsrack, anbefales det at kabinettene blir montert slik at de har samme jordingspotensial.**

CAUTION

CAUTION: **Before attempting to install or remove any of the components, ensure that anti-static precautions have been taken. The minimum requirement is a properly grounded anti-static wrist strap and grounding wire.**

ACHTUNG: **Vor dem Entfernen oder Installieren einer Komponente sollte sichergestellt werden, dass antistatische Vorsichtsmaßnahmen ergriffen wurden. Mindestanforderung sind ein ordnungsgemäß geerdetes Antistatik-Armband und ein Erdungskabel.**

FÖRSIKTIGHET: **Se till att antistatiska åtgärder vidtages innan någon av komponenterna installeras eller avlägsnas. Minimikravet är ett ordentligt jordat antistatiskt armband och jordledning.**

VAROITUS: **Ennen komponenttien asentamista tai poistamista varmista, että antistaattisista varotoimenpiteistä on huolehdittu. Vähimmäisvaatimuksina on asianmukaisesti maadoitettu antistaattinen rannehihna ja maadoitusjohto.**

FORSIGTIG: **Før du forsøger at installere eller fjerne en af komponenterne, skal du tage antistatiske forholdsregler. Minimumskravet er en korrekt jordet, antistatisk håndledsrem og en afleder.**

OBS: **Før det blir gjort forsøk på installere eller fjerne komponenter, må det tas forholdsregler for å avverge statisk elek-**

CAUTION

trisitet. Minimumskravet er riktig jordet antistatisk håndleddstropp og jordingsledning.

CAUTION: When installing or removing a rackmount shelf, remove all power supplies and disk drives. It is recommended that you work with at least one other person when installing a disk shelf. This is necessary to prevent personal injury and damage to the shelf.

ACHTUNG:**Vor der Installation oder dem Entfernen eines Rackmontagefachs müssen alle Netzteile und Laufwerke entfernt werden. Es wird empfohlen, die Installation des Laufwerkfachs von mindestens zwei Personen vornehmen zu lassen. Dies ist notwendig, um Verletzungen bzw. Schäden am Fach zu vermeiden.**

FÖRSIKTIGHET: **När en utrustningshylla installeras eller avlägsnas ska all strömtillförsel bortkopplas och alla skivdrivenheter avlägsnas. Det rekommenderas att du arbetar med minst en person till när en skivhylla ska installeras. Detta är nödvändigt för att förhindra personliga skador och skador på hyllan.**

VAROITUS: **Poista kaikki teholähteet ja levyasemat ennen hyllyn asentamista kehykseen tai poistamista kehyksestä. Levyhyllyä asennettaessa on suositeltavaa käyttää ainakin yhtä avustajaa. Tämä on välttämätöntä loukkaantumisten ja hyllyn vaurioitumisen välttämiseksi.**

CAUTION

FORSIGTIG: **Når en rackmonteret hylde installeres eller fjernes, skal al strømforsyning og alle drev fjernes. Det anbefales, at der mindst er én anden person til stede, når en drevhylde installeres. Det er nødvendigt for at undgå personskade og beskadigelse af hylden.**

OBS: **Når hylle for rackmontering blir installert eller fjernet, må alle strømforsyninger og diskstasjoner fjernes. Det anbefales at du arbeider sammen med minst én annen person når du installerer en diskhylle. Dette er nødvendig for å hindre personskade og skade på hyllen.**

CAUTION

CAUTION: **The tower skin set is not a field replaceable unit and therefore must not be removed from the Storage Array.**

ACHTUNG: **Das Tower-Gehäuse kann nicht am Einsatzort ausgetauscht werden und sollte deshalb nicht entfernt werden.**

FÖRSIKTIGHET: **Det yttre höljet är inte en utbytbar enhet och skall därför inte avlägsnas från lagringsuppsättningen.**

VAROITUS: **Tornikehys ei ole paikan päällä vaihdettavissa eikä sitä saa poistaa muistijärjestelmästä.**

FORSIGTIG: **Søjleindkapslingen kan ikke udskiftes på stedet og må derfor ikke fjernes fra lagringssystemet.**

OBS: **Det ytre dekselet er ikke konstruert for å kunne skiftes på stedet, og må derfor ikke fjernes fra lagringskabinettet.**

CAUTION

CAUTION: **After removing the LS Module the resulting hole must be blocked by installing a blanking plate or by installing a replacement LS Module. Failure to do this can disrupt airflow and seriously reduce cooling.**

ACHTUNG: **Nach dem Entfernen des LS Module muss die entstehende Lücke durch eine Blende oder durch die Installation eines anderen LS Module geschlossen werden. Wird dies nicht beachtet, kann es zu Unterbrechung der Luftzufuhr und zu stark verminderter Kühlung kommen.**

FÖRSIKTIGHET: **När en LS Module avlägsnas skall utrymmet som blir kvar blockeras genom att en blindplåt installeras eller genom att sätta in en ny LS Module. Ett allvarligt avbrott i luftflödet kan orsakas och därmed reducera kylningen om detta inte görs.**

VAROITUS: **LS Module-valvontayksikön poistamisen seurauksena syntyvä aukko on peitettävä suojalevyllä tai asentamalla uusi valvontayksikkö entisen tilalle. Muussa tapauksessa ilmavirran kulku saattaa häiriintyä, mikä heikentää jäähdytystä merkittävästi.**

FORSIGTIG: **Når LS Module er fjernet, skal det hul, der opstår, dækkes. Det gøres enten ved at påsætte en udstanset plade eller ved at installere en anden LS Module til erstatning. Hvis du ikke gør det, kan det give forstyrrelser i luftstrømningerne og reducere afkølingen alvorligt.**

WARNING

OBS: **Når en LS Module er fjernet, må hullet blokkeres ved å installere en maskeringsplate eller ved å sette inn en annen LS Module. Dersom dette ikke gjøres, kan det forstyrre lufttil-strømningen og gi sterkt redusert kjøling.**

WARNING: **A possible shock hazard may exist in the area of the fan connection.**

VORSICHT: **Im Bereich des Lüftungsanschlusses besteht Stromschlaggefahr.**

VARNING: **Det finns risk för elstötar i området runt fläk-tanslutningen.**

VAARA: **Tuuletinliitännän ympäristössä voi olla sähköiskun vaara.**

ADVARSEL: **Der er fare for stød i området, hvor ventilatoren er tilsluttet.**

ADVARSEL: **Det kan være en viss risiko for elektrisk støt i nærheten av tilkoblingspunktet for viften.**

Appendix B: Technical Specifications

Host Interface

- One or two Fibre Channel interfaces, 100MB\s each, 200 MB\s total.
- External hub and switch support.

Disk Drive Interface

- Dual independant Fibre Channel interfaces, 100MB\s each, 200MB\s total.
- Failover by each controller to both Fibre Channel Loops

Controller Specifications

RISC Processor:	StrongArm SA 110@233Mhz
ECC protected Cache:	Up to 256 MB
Hardware XOR:	Yes
Processor Memory:	32 MB
Flash Memory:	2 MB
ECC Memory Support:	Yes

System

Max drives per enclosure:	Up to 14 drives
Max drives per subsystem:	Up to 112 drives

Redundant, Hot Swappable Components

- Two RAID controllers or copper/optical I/O modules, removable from the rear.
- Two power supplies, removable from the rear.
- Two advanced cooling modules, removable from the rear.
- Two loop resiliency and SES modules (LS), removable from the front.
- Up to 14 disk drives, removable from the front.
- Two independent AC power inlets.

Maximum Cable Lengths

- Copper: 30 meters (equalized cable) from server or switch/hub to enclosure.
- Optical: 500 meters using a copper/optical adapter from server or switch/hub to enclosure.
- 10 meters (equalized cable) between successive enclosures.

Physical Dimensions

Deskside Enclosure

Height: 20 inches (50.8cm)

Width: 9 inches (22.9cm)

Depth: 20 inches (50.8cm)

Weight: 75 lbs (34kg) maximum

Rack Enclosure

Height: 5.22 inches (13.3cm)

Width: 15.5 inches (44.5cm)

Depth: 20 inches (50.8cm)

Weight: 75 lbs (34kg) maximum

Warranty

Three (3) years

Monitoring

Temperature, advanced cooling modules, power supplies, disk drives, loop resiliency modules, I/O modules

Failure Notification

In-band reporting SES; LEDs; audible alarm; Vision storage management software.

Disk Drives

Capacity:	9GB, 18GB, 36GB
Rotational Velocity:	18GB - 10K RPM; 18GB -15K
Data Buffer:	4MB
Form factor:	3.5”
Height:	1.0”
Interface:	Fibre Channel

Power Supply

Power Supply Input

Input Voltage:	85 - 264 VAC
Input Frequency:	47 - 63 Hz
Peak Inrush Current:	20A @ 115VAC, 25°C 40A @ 230VAC, 25°C
Power Factor Correction:	Per EN61000-3-2
Minimum Efficiency (%)	70%
Minimum Hold-Up Time	20 msec @ 85VAC
Max. Peak Output Power	853 Watts
Max. Average Output Power	673 Watts
Emissions EN50081-1 FCC docket 20780, class B EN55022, Class B	3db margin for conducted emissions when tested at system level. 3db margin for radiated emissions

Power Supply Output

Output Parameter	5 VDC Outout	12 VDC Output	3.3VDC Output
Nominal Voltage (VDC)	5.05	12.05	3.3
Full Load (A)	44.0	35.0	10.0
Peak Load (A) 1 second	44.0	50.0	10.0
Minimum Load (A)	0.0	0.0	0.0
Transient Load Step (A)	5.0	15.0	4.0
Min. Overload (A)	45	36	11
Max. Overload (A)	55	50	17
Min. Peak Overload (A)	45	50	11
Max. Peak Overload (A)	55	57	17
Max. Ripple (mV p-p)	50	100	50
Min. Upperband Fault	4.655	11.172	3.036
Max.Upperband Fault	4.845	11.628	3.168
Min. Overvoltage Fault	5.7	13.3	3.6
Max. Overvoltage Fault	6.3	14.7	3.9
Line Regulation (+/-%)	1.0	1.0	1.0
Load Regulation (+/-%)	2.0	5.0	2.0
Set Point Accuracy (+/- mVDC) at 25°C. At 50% output load.	75	200	50

Electrical Rating

The enclosure input current is 100 - 240 VAC, 10 - 5 Amps, 50/60Hz

Temperature

- Operating Temperature: 0°C to 40°C
- Temperature Storage: -40°C to +70°C
- Maximum rate of temperature change: 20°C per hour

Humidity

- Relative Humidity Operating: 5% to 95%, non-condensing
- Relative Humidity Storage: 5% to 95%, non-condensing

Altitude

- Altitude Operating: -50 to 10,000 feet
- Altitude Storage: -50 to 40,000 feet

Operational Shock

Half sine shock: 5G half sine shock with a pulse duration of 11 milliseconds or less. No permanent damage will occur at or below this level.

Operational Vibration

The operational vibration supported is 0.2G @ 5Hz to 400Hz. No permanent damage will occur at or below these levels.

Regulatory Agency Compliance

Product Safety Standards

- UL1950 Information Technology Equipment (US)
- CSA C22.2 No 950 Informaion Technology Equipment (Canadian Law)
- EN 60950 Information Technology Equipment (European Norm)

Product Safety Third Party Certifications

- UL Listed USA
- CSA Certification Canada
- CB Certificate and Report from NEMKO
- NEMKO Norway
- TUV-GS German

CE Mark

Emission Testing: Light Industry CENELEC EN 50 081-1,1995

- Radiated Emissions CENELEC EN 55 022, 1992
- Conducted Emissions CENELEC EN 55 022, 1991

Immunity Testing: CISPR 24 for ITE

Immunity Testing: Light Industry CENELEC EN 50 082-1, 1997

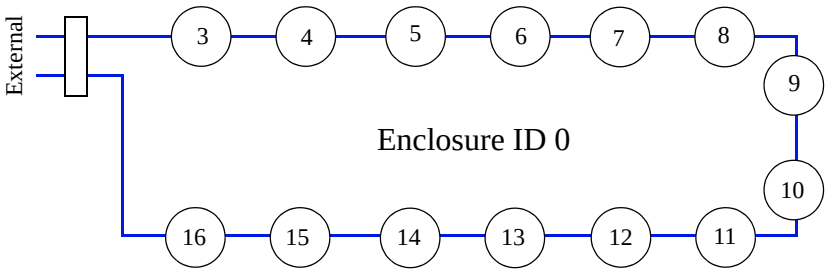
- Electrostatic Discharge CENELEC EN 61000-4-2, 1995
- Radiated Immunity CENELEC EN 61000-4-3
- Electrical Fast Transients (Burst) CENELEC EN 61000-4-4 1995
- Transient (Surge) CENELEC EN 61000-4-5,1995
- Conducted Immunity CENELEC EN 61000-4-6
- Power Line Interruption CENELEC EN 61000-4-11

Electromagnetic Radiation

- United States FCC Part 15, Computing Equipment
- Canadian DOC, Data Processing Equipment

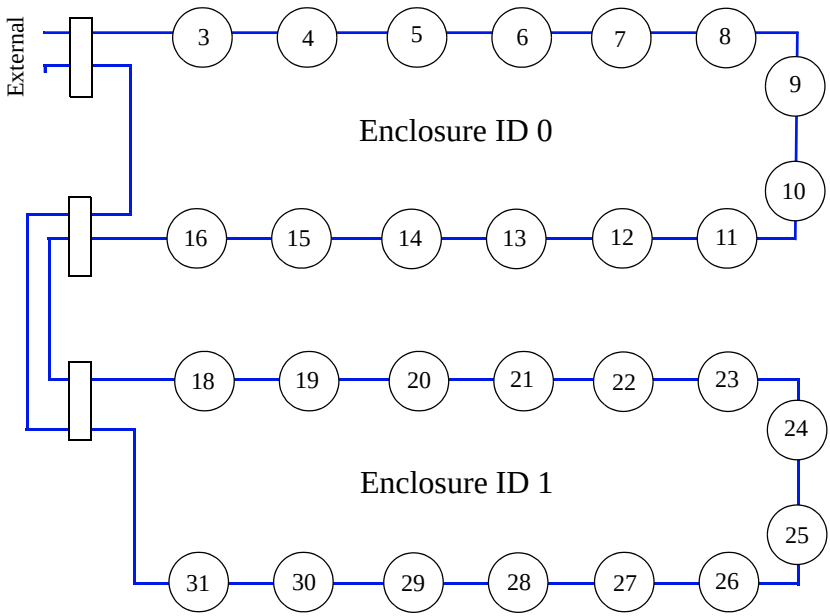
Appendix C: Configuration Loop Diagrams

Loop Diagram for a Single Enclosure System - Single Loop



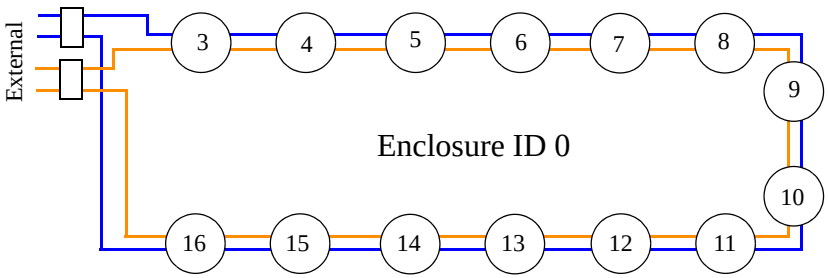
Circles denote disk drives with drive ID shown.

Loop Diagram for a Dual Enclosure System - Single Loop



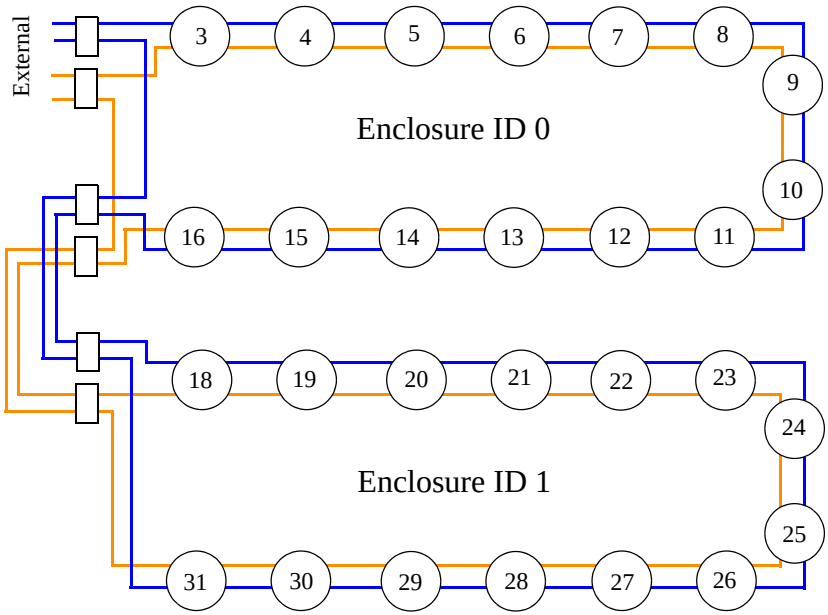
Circles denote disk drives with drive ID shown.

Loop Diagram for a Single Enclosure System - Dual Loop



Circles denote disk drives with drive ID shown.

Loop Diagram for a Dual Enclosure System - Dual Loop



Circles denote disk drives with drive ID shown.

Index

A

advanced cooling module, leds, 54
advanced cooling modules, 18, 61, 62
air flow, 29
ambient temperature, 28
audience, 11

C

cable length, 76
cabling, dual i/o module, 37
cabling, dual raid controller, 44
cabling, single i/o module, 35
cabling, single raid controller, 41
circuit overloading, 30
communication, esi, 47
compliance, agency, 81
controller, raid, 20
conventions, 11
current, input, 30, 80

D

daisy chaining, 35, 38, 42, 45
dimensions, 76
disk drive, carrier, 18, 57
disk drive, leds, 51
disk drives, 77
dual i/o module, configuration, 37
dual raid controller, configuration, 44

E

enclosure id, 31
expansion modules, 20

F

fans, 18
fcc statement, 12
features, 17

H

hot swappable, 76
humidity, 80

I

i/o modules, 63
i/o modules, copper hssdc, 20
id settings, 31
id table, 33
installation, 25
interface, disk drive, 75
interface, host, 75

L

leds, enclosure, 48, 50
leds, ls module, 48
length, cables, 76
loading racks, 29
loop resiliency and ses module, 47
ls module, 59

M

monitoring, system, 47, 77

N

notification, 77

O

operating temperature, 28

P

part numbers, 21
peak power, 53
port bypass circuits, 47
power rating, 30
power supplies, 18, 61, 78
power supplies, leds, 53

R

rack mounting, 28
raid controller, 20, 63
raid, 40
redundancy, 76
redundant controllers, 44
regulatory agency, 81

S

safety statements, 14, 26
safety statements, translations, 26, 65
shock, operational, 80
single i/o module, configuration, 35
single raid controller, configuration, 41
specifications, technical, 75
support, 5, 12

T

technical specifications, 75
temperature, 28, 80
translations, safety statements, 65

U

unpacking, 28

V

vibration, operational, 80

W

warranty, 3, 77
world wide support centre, 12